

1. A method for forming a low-k dielectric layer comprising:
providing a substrate;
forming on said substrate, by a process comprising the organic growth and sacrifice of living biological material, a low-k dielectric layer of structural integrity.
2. The method of claim 1 wherein the substrate is a microelectronics fabrication having topographic features comprising at least metal lines with spaces between them.
3. The method of claim 2 wherein the substrate is at least partially covered by a protective and adhesion enhancing dielectric layer.
4. The method of claim 3 wherein the dielectric layer is a layer of silicon rich oxide formed to a thickness between approximately 300 to 2000 angstroms.
5. The method of claim 4 wherein said organic growth and sacrifice process further comprises:
applying a culture medium on said substrate;
seeding the culture medium with living microorganisms, said microorganisms having cell walls filled with intercellular material;
allowing the microorganisms to grow and multiply until a predetermined thickness of the microorganism seeded culture medium has been attained;

drying the microorganism seeded culture medium using a drying medium,
whereby said microorganisms are sacrificed, said intercellular material is eliminated and
is replaced by said drying medium, said cell walls are hardened to provide structural
integrity and a low-k dielectric layer is thereby formed;
forming a capping layer over said low-k dielectric layer;
planarizing said capping layer.

6. The method of claim 5 wherein said capping layer is a layer of silicon rich oxide
formed to a thickness of between approximately 300 to 2000 angstroms.
7. The method of claim 5 wherein the culture medium is formed so as to cover the
adhesion enhancing and protective layer and fill the spaces between the metal lines and
other topographic features.
8. The method of claim 6 wherein the culture medium is a mixture of specific
nutrients for specific cell lines.
9. The method of claim 7 wherein the microorganisms seeding the culture medium
are specific cell lines appropriate to the medium.
10. The method of claim 9 wherein the microorganisms are cultures of coral cell
lines.

11. The method of claim 9 wherein the microorganisms are cultured from silicon-rich algae lines.

12. The method of claim 9 wherein the microorganisms are cultured from genetic clones of coral cell lines.

13. The method of claim 9 wherein the microorganisms are cultured from genetic clones of silicon-rich algae lines.

14. The method of claim 5 wherein the drying medium is air.

15. The method of claim 5 wherein the drying medium is an inert gas.

16. A microelectronics fabrication having an low-k dielectric layer formed thereon comprising:

a substrate having topographic features comprising at least metal lines with spaces between them.

a protective and adhesion enhancing dielectric layer formed on said substrate;

a low-k dielectric layer formed on said protective and adhesion enhancing dielectric layer, said low-k layer further comprising the skeletal remains of

microorganisms wherein the regions within and between said remains contain air or inert gas;

a planarized capping layer, formed over said low-k dielectric layer.

17. The fabrication of claim 16 wherein said adhesion enhancing dielectric layer and said capping layer are layers of silicon rich oxide formed to a thickness between approximately 300 and 2000 angstroms.

18. The fabrication of claim 17 wherein said skeletal remains were formed by drying a nutrient rich culture medium containing living microorganisms that had been applied to said substrate.

19. The fabrication of claim 18 wherein said skeletal remains are the hardened cell walls of said microorganisms.

20. The fabrication of claim 19 wherein the microorganisms are cultures of coral cell lines.

21. The fabrication of claim 19 wherein the microorganisms are cultured from silicon-rich algae lines.

22. The fabrication of claim 19 wherein the microorganisms are cultured from genetic clones of coral cell lines.

23. The fabrication of claim 19 wherein the microorganisms are cultured from genetic clones of silicon-rich algae lines.

24. A multilevel microelectronics fabrication having a low-k dielectric layer formed on each level, said layer comprising:

a protective and adhesion enhancing layer formed on said level;

a low-k dielectric layer formed on said protective and adhesion enhancing layer, said low-k layer being formed of the hardened cell walls of microorganisms and the regions within and between said cell walls being filled with air or an inert gas;

a capping layer, formed over said low-k dielectric layer and planarized.